Title	Nurses' perceived stress and compassion following a mindfulness meditation and self compassion training
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Abstract

The pilot study explored the effects of a mindfulness based stress reduction (MBSR) intervention on nurses' perceived stress (PS) and compassion. A quasi experimental pre-test- post-test design was used. Nurses (n=90) working at three university teaching hospitals completed the Perceived Stress Scale (PSS) and Compassion Scale (CS) at the beginning of the MSBR intervention and 64 completed the scales at the end of the intervention. The 64 matched data sets were analysed using the t-test, Chi Square test and ANOVA. The findings indicated that the nurses' perceived stress was significantly reduced after the intervention. Notably, compassion scores were increased after the intervention, and this finding was significant for nurses working at one of the hospitals. There were no significant differences between results from a six week or eight week MBSR intervention. The results suggest that a MBSR can impact positively on nurses' perceived stress and also enhance nurses' compassion. MBSR may well be a suitable self-care, stress management intervention that can effectively teach nurses coping skills to assist them manage daily stressors inherent in their home and work life.

Key words: nurses, stress, compassion, mindfulness, mindfulness based stress reduction, quasi-experiment.

Introduction

Stress and burnout are common among nurses and self-care strategies aimed at building resilience among staff needs to be promoted (Yoder, 2010). Nurses experience particularly high stress in relation to demands, control, roles and relationships, compared with other professionals (Royal College of Nursing, 2006). Nurses report experiencing numerous stressors throughout the working day, such as conflict with physicians, uncertainty about treatment, confrontational relatives and aggressive patients (Chang et al., 2007; Angland et al., 2014), and moral distress (Kilcoyne and Dowling, 2007). Poor collegial support, interdisciplinary conflict and lack of camaraderie can also undermine nurses' support system resulting in nurses being more vulnerable to stress (Healy and McKay, 2000; Morano, 1993; Bratt, et al., 2000; Westphal et al., 2015). In addition, a recent Irish study identified redeployment to alternative clinical areas as the predominant stressor (Donnelly, 2014). This finding coincides with previous studies citing reallocation of nurses, role change and role ambiguity following organisational change as a recognised stressor (Su et al., 2009; Castledine, 1998). Morevoer, high levels of secondary traumatic stress among Irish nurses has also been recently reported (Duffy et al., 2015).

Burnout can develop following exposure to prolonged interpersonal and emotional stressors (García-Izquierdo and Ríos-Rísquez, 2012). Compassion fatigue and burnout are closely related concepts and ambiguously defined (Potter et al., 2013). Compassion fatigue was described by Figley (1995) as the cost of caring. It is a combination of secondary traumatic stress and burnout. In contrast to burnout, the onset of compassion fatigue can be sudden in response to exposure to devastating illness or trauma (Valent, 2002). A nurse experiencing compassion fatigue may exhibit guilt, nervousness, helplessness or anger and it negatively impacts on ability

to show empathy or compassion. Those affected dislike going to work and easily engage in conflict with colleagues. In addition to having a negative impact on nurses' health, chronic stress and burnout can affect nurses' ability to empathise with patients (Neff, 2003). Stress, burnout and compassion fatigue impact negatively on the caring relationship and the healing environment (Wakim, 2014). This has relevance for nursing due to the estimated 40% of nurses who report occupational burnout (Irving et al., 2009).

Good self care skills have been correlated with decreased stress and caregiver burden (Merluzzi et al., 2011). Mindfulness based stress reduction (MBSR) is an educational based training programme focused on the contemplative concept of mindfulness and has been shown to reduce stress (Chiesa and Serretti, 2009). MBSR is not a new concept but has emerged in recent years as a self care method that may confer protective effects against stressors at home and at work (Westphal et al., 2015). MBSR combines instruction and practical training in mindfulness techniques to improve physical and psychological wellbeing (Kabat Zinn, 1990), and may provide nurses with the ability to promote self care needs to enable them to be more present and more compassionate with patients. By acquiring the skills to be more mindful and present, nurses may be increasingly conscious of and attentive to their own self care needs, thus being more present in both their personal and professional lives (Rothschild, 2006).

As a practical approach to maximise MBSR attendance researchers have utilised condensed MBSR interventions of four week duration (Mackenzie et al., 2006; Pipe et al., 2009; Brady et al., 2012). Some of the condensed MBSR intervention studies have produced encouraging results, albeit ambiguity remains as to what length of

MBSR is required to create prolonged and beneficial effects for nurses (Smith, 2014).

Studies exploring the effectiveness of MBSR interventions report increased self care among nurses (Cohen Katz et al., 2005a), improved feelings of empowerment and self learning (Birnbaum, 2008), increased feelings of personal accomplishment (Cohen Katz et al., 2005b), improved mood (Galantino et al., 2005), decreased depression (Shapiro et al., 1998), increased mindful presence and greater ability to self care which enhances nursing practice (Brady, 2012). Furthermore, White (2014) suggests that MBSR has potential to enhance the caring environment by promoting empathy, self awareness and compassion. More recently, Craigie et al., (2016) report on a resiliency and self-care mindfulness-based intervention reducing nurses' level of burnout.

Aim

This pilot study used a quasi-experimental, pre-test post-test design, and aimed

to determine if a MBSR intervention had an effect on nurses' self-reported levels of perceived stress (PS) and levels of compassion. The study also aimed to compare any differences in the nurses' responses between a six week and eight week MBSR course, and determine how feasibility it was to undertake the intervention in the evening time after the nurses had finished their shifts.

Methods

Sample and Setting

A non-probability, convenience sample was used. All registered nurses working in three university hospitals were invited to undertake the MBSR intervention and take

part in the study. Nurses who had already attended a MBSR course or who already meditated and/or practised mindfulness were excluded.

The three University teaching hospitals included in this study are located in one regional area in the West of Ireland. Hospital 1 has 306 beds; hospital 2 has 318 beds and hospital 3 is a 708 bed specialist centre for the region. Nurses from each hospital were recruited locally following an advertisement outlining the MBSR intervention courses and the study protocol. The MBSR intervention course ran for a duration of 8 weeks at hospitals 1 and 3, and for 6 weeks' duration at hospital 2. The shorter duration of 6 weeks in hospital 2 was by local agreement. The only difference between this shorter course and the 8 week course was less focus on self-compassion. The MBSR intervention in all three sites was delivered for two hours each week in the evenings, after the nurses' shifts had ended. Moreover, the intervention was provided by the same qualified MBSR instructor for the three sites. Ethical approval was provided by the ethics committee of each hospital.

Study questionnaires

The study questionnaire consisted of two scales and a demographic questionnaire. A pre-test of the study questionnaire was undertaken prior to the pilot study to determine how long the questionnaire would take to complete. Eight nurses who had previously attended a MBSR course completed the questionnaire in an average time of 14 minutes.

The study's two scales were the perceived stress scale (PSS) and the compassion scale (CS). The PSS is a 10 item 5 point Likert scale inventory designed to measure the degree to which situations in one's life are appraised as stressful within the previous month. The PSS10 has been used across a variety of studies

internationally and has shown to be psychometrically sound (Lee, 2012), with Cronbach's alpha scores of .82 (Remor, 2006) and .89 (Roberti et al., 2006). In this study, pre and post intervention Cronbach's alpha scores for this scale were .79 and .74 respectively.

The 10 items on the PSS are summed providing a perceived stress ranging from 0 to 40. Higher scores on the perceived stress scale are indicative of high levels of perceived stress.

The compassion scale (CS), a 24 item Likert scale, is an adaptation of the self-compassion scale, designed to evaluate three recognised aspects of compassion: kindness versus indifference, common humanity versus separation and mindfulness versus over disengagement (Pommier, 2011). The CS has a reported Cronbach's alpha .90. The CS also had a split –half coefficient of .90 (Pommier, 2011). Pre and post intervention Cronbach's alpha scores for this scale were .81 and .77 respectively

Procedure

On day one of the MBSR course the study participants completed the pre-test questionnaire. In order to create a unique identifier code and ensure anonymity, each participant was also asked two additional questions (What is your star sign? What are the last three digits of your mobile phone number?). At the final MBSR session (8 weeks later at hospitals 1 and 3 and 6 weeks later at hospital 2), participants were requested to complete the post-test questionnaire. The researchers had no direct contact with the participants and were not involved in data collection.

Analysis

The pre and post-test questionnaires were matched by the unique identifiers. The Statistical Package for Social Sciences (SPSS Version 21) was used for data analysis. The level of significance was set at $p < 0.05$. All data was normally distributed based on analysis of skewness and kurtosis values being between-2 and +2, which is considered acceptable in order to show normal distribution (George & Mallery, 2010), justifying the use of parametric testing. The *t*-test for paired groups was used to test the difference between the means of the paired groups' pre-test and post-test for the same individuals. A Chi Square test was used to examine and compare differences between demographic variables between participants at hospitals 1, 2 and 3. A series of ANOVA's were used to examine differences between pre and post scores and post intervention effects between the three hospitals.

Results

A total of 90 completed pre-test questionnaires were received. However, the number of post-test questionnaires returned was lower (n=64). This was due to non-attendance at the final MBSR session (Table 1)

Insert Table 1 here

The study sample that commenced the intervention comprised of ninety registered nurses (89 females; 1 male). The mean age of the total sample was 44.16 years (SD = 8.26), the minimum age 24 and the maximum was 62 years old. The mean number

of years since registration for the total sample was 21.06(SD=9.16) years (range 3-34) (Table 2). Seventy one (78.9%) were staff nurses, 4.4% (n=4) were clinical nurse specialists or advanced nurse practitioners, 13.3% (n=12) were nurse managers, and 3.3% (n=3) of the sample were midwives (Table 2).

Insert Table 2 here

The sample was fairly homogeneous across the three hospitals, with no significant difference in mean age $F_{(2,89)}$=.963 p = .386, number of years the nurses were registered $F_{(2,84)}$= .167, p = .847, numbers of years in current position, X^2 (8,N=90)=5.30:, p = .725, and current position (X^2 (6,N=90)= 10.16: ,p = .118 (Table 2).

At baseline, the nurses' mean perceived stress score for the total sample was 21.57 (SD= 4.77). A one way between-subjects ANOVA revealed that there was a significant difference between perceived stress scores of the nurses at hospital 1(M = 24.33 SD = 5.36); hospital 2 (M = 21.93, SD = 4.33) and hospital 3 (M = 20.16, SD= 4.73), $F_{(2,89)}$ =5.875, p=.004. (Table 3). Specifically, there was a significant difference between hospitals 2 and 3 (p=.038) and between hospitals 3 and 1 (p=.008). However, there was no significant difference between hospitals 1, 2 or 3 at baseline in compassion (Table 3) $F_{(2,89)}$=2.305, p=.106.

A mixed ANOVA was conducted to determine any significant change in perceived stress scores across hospitals (between-subjects factor) and time (within-subjects factor). There was a main effect of time (F1, 61) = 113.21, p<.001, partial η^2= .65. To control for family wise error rate, Bonferoni adjusted t-tests were used (alpha level = .017). Results indicated a reduction in the mean scores and a significant difference between pre test and post test perceived stress across all three hospitals:

hospital 1 t (8) =5.660, p<.001; hospital 2 (t(29) = 7.16, p<.001) and hospital 3 (t(24) = 7.863, p<.001) (Table 3). This finding represents a total sample score decrease to 13.35 (SD= 5.12) and demonstrates significant decreases from pre to post intervention perceived stress scores. There was no main effect for location, F(2, 61) = .255, p = .086, partial η^2= .077. Similarly, there was no time x location interaction; F(2, 61) = .357, p = .701, partial η^2= .012).

A mixed ANOVA was also conducted on compassion scores. The within subjects factor was time (pre and post), and the between subjects factor was location. There was a main effect of time, F(1, 61) = 18.369, p <.001, partial η^2=.231, indicating a strong effect size. Post compassion scores were higher (M = 98.89, SD = 8.80) than pre compassion scores (M = 92.58, SD = 8.15). There was no main effect of location F(2, 61) = .341, p= .712, partial η^2= .011. However, there was a significant time x location interaction, F(2,61) = 3.803, p = .028, partial η^2= .111.

There was a greater increase from pre-test to post-test compassion scores among nurses in hospital 3 when compared to hospitals 1 and 2, t (24) = 7.86, p<.001. = 7.20. The mean post-test compassion scores were also increased for nurses at hospitals 2 and 3, but t-test values indicated no statistical significance for these results (Table 3).

Insert Table 3 here

On the Compassion Scale, participants' scores were significantly higher after the MBSR intervention for the positively scored subscales: kindness t(63) = -2.077, p = .042 and mindfulness t(63) = -5.672, p<.001. There was no significant change in common humanity scores, t(63) = 147, p = .884. There were significant reductions at

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post-test in the three negatively scored subscales of the compassion scale; indifference (t(63) = 3.48, p = .001, separation (t(63) = 2.820, p = .006) and disengagement (t(63) = 4.40, p<.001 (Table 4).

Insert Table 4 here

Finally, there were no conclusive significant differences between scores for participants who attended the six week intervention in comparison to participants who attended the eight week intervention.

Discussion

This study has demonstrated that MBSR can impact positively on nurses' perceived stress and also enhance nurses' compassion levels. Before the MBSR intervention the study participants' mean perceived stress score was 21.57 (sd 4.77). A score of 21.57 represented high PS when compared against the gender and age matched normative means for perceived stress for females which range from 11.9 to 14.2 (Cohen et al., 1983). This indicated that high levels of stress were recorded among the nurses across the three hospitals. However, significant decreases in PS scores were evident with perceived stress levels significantly reduced at post-test following the MBSR intervention for all three hospitals. This finding is consistent with other studies suggesting that MBSR is an effective stress management intervention among hospital based nurses (Penque, 2009; Mackenzie, 2006; Cohen Katz, 2005b; Pipe et al., 2009; Brady, 2014; Horner et al., 2014;), and supports previous research suggesting that an MBSR intervention is a practical and collegial way to provide health care workers with the self-care tools to manage stress (Fortney et al., 2013) and reduce nurses' burnout levels (Craigie et al., 2016). In addition, the elevated

pre-test stress levels demonstrated in this study reflect the findings from other studies that also established high base-line perceived stress scores utilising the PSS (Shapiro et al., 2005; Duchemin et al., 2015; Moody et al., 2013).

The significant reductions in perceived stress levels demonstrated in this study are similar to those recorded by Shapiro et al., (2005) who recorded pre-test mean PS levels of 28.89 reducing to 21.22 at post-test following an 8 week MBSR intervention. Fortney et al. (2013) also reported significant reductions in perceived stress following an abbreviated MBSR for a group of primary care clinicians. Mean pre-test PS scores of 19.0 were recorded reducing down to post-test mean PS of 14.1 and significant reductions in burnout on the three dimensions of the MBI scale (Fortney et al., 2013). Similarly, Brady et al., (2014) demonstrated reduced stress levels among psychiatric nurses, but had recorded lower base line pre-test PS scores (14.83) that were more aligned to age and gender matched normative values. These levels were similar to those reported by Hallman et al., (2014) who recorded a significant effect on PS scores from a pre-test mean (14.83) that decreased to 9.67 at two months post MBSR intervention.

Our study also explored changes in nurses' level of compassion from pre to post MBSR intervention using the compassion scale. Compassion was measured because it is suggested that increased compassion is a buffer against stress and enhanced wellbeing among nurses can improve patient care provision (Gustin and Wagner, 2013; Maben et al., 2012). Moreover, compassion and mindfulness are considered 'trainable' qualities related to burnout (Cramer et al., 2016). Nurses at the three hospitals had a total mean pre-test compassion score of 92.57 which increased to a mean post test score of 98.89. Nurses' mean compassion scores were consistently increased across the three hospitals but only significantly in hospital 3.

Increases in the mindfulness subscale of 15.31 to 16.85 demonstrated a significant increase p = .000 following *t*-test analysis. The increase in post-test mindfulness following MBSR interventions is in keeping with other studies (Cohen-Katz et al., 2005b; Shapiro et al., 2005; Schenström et al., 2006). However, in a study exploring the effect of a MBSR intervention on compassion using the Santa Clara Compassion scale (SCCS) (Fortney et al., 2013), no changes in compassion measures at post-test were noted in the 39 clinicians. The researchers attributed this finding to high baseline compassion scores (Fortney et al., 2013).

It has been suggested that compassion for others is closely associated with the ability to self-care (Neff, 2003). Reducing stress and burnout among nurses is believed to enhance wellbeing, and this can impact positively on the quality of care a patient receives (Dawson, 2009). The connection between nurse wellbeing, compassion and enhanced patient care are also pertinent to this study. It has been suggested that nurses need to work in a compassionate environment that is conducive to caring (Boorman, 2010) and that mindfulness based training program can result in enhanced quality care for inpatients (Watanabe et al., 2015). The promotion of health and wellbeing among health care staff and the positive impact it can have on the quality of patient care was reflected in the United Kingdom policy document entitled Compassion in Practice (Department of Health, 2012). This document alludes to compassion as a critical aspect of patients' care. It highlights the importance for staff to feel supported and for health and wellbeing to be addressed and optimised (DOH, 2012). Organisational leadership that promotes and facilitates self-care behaviours for staff, fosters a sense of care among staff making them more likely to engage in holistic, compassionate care towards their patients (Maben et al., 2012; Richards, 2013).

Finally, this study also determined no significant difference between the six week and the eight week MSBR intervention. Previous studies have demonstrated encouraging results in relation to stress and burnout following condensed MBSR interventions (Brady et al., 2012; Moody et al., 2013; Foureur et al., 2013). The challenge is to establish an MBSR course of a duration that produces effective results and is practical and achievable within the constraints of nurses' shift work and busy schedules. Future research could focus on comparing the traditional length 8 week programme with condensed programmes and time of participant meditation input with regards to time (Smith, 2014). In addition, a mixed method design would be useful and with the inclusion of individual and focus group interviews.

Limitations

A major limitation of this study was the lack of a randomised control group against which comparisons on pre and post test results could be made. A non-probability, convenience sample carries the risk of sampling bias and weakens the study's findings.

The exclusive use of self-report scales for data collection can result in response bias (McGee Ng et al., 2016). Nurses may not be willing to admit they lack compassion. In addition, compassion, is a complex construct and challenging in terms of accurate measurement. The psychometric properties of compassion are not stable and vary across people with different backgrounds (Zeng et al., 2016). A number of compassion measures include qualitative elements (Papadopoulos and Ali, 2016) and including some open-ended questions may have been useful in this study.

There is the possibility of bias as a result of positive group interaction and facilitator-participant dynamics following the MBSR intervention. The sample was self-selected and therefore were possibly motivated individuals with an interest in MBSR interventions. Moreover, although the course was subsidised by the nurses' employers, they were required to pay a contribution towards the cost. This may have affected the recruitment and study outcomes. Similarly, nurses experiencing symptoms of stress or burnout may have decided not to participate due to the requisite time commitment and the cost. The lack of a control group makes it difficult to determine to what extent participants' motivation impacted on the results.

Participants' non-attendance at the final MBSR session resulted in 64 completed data sets. No attendance records were kept throughout the intervention so it is unknown if those who did not attend on the final session had also not attended earlier sessions. This attrition rate of 29%, although relatively high, is consistent with previous studies, where issues such as shift work and 24 hour provision of health care affected attendance (Galantino et al., 2005; Moody et al., 2013). Furthermore, similar studies with nurses have achieved comparable samples, for instance, Penque, (2009) who achieved a sample of 71 and Cohen Katz et al. (2005a) who achieved 25. More recently, Duchemin et al. (2015) surveyed emergency department nurses (n=50) and Gauthier et al. (2015) surgical nurses (n=45). In the context of these aforementioned studies, our 64 completed data sets compares favourably.

Conclusion

The prevalence of high pre intervention perceived stress levels among nurses in this study highlights the importance of proactive, self-care behaviours among nurses.

This study supports the potential for MBSR interventions for reducing stress among nurses. The findings also suggest that MBSR may well hold potential for nurturing the crucial element of compassion among nurses while reducing stress by addressing their self-care needs. Health care organisations should consider the introduction of ongoing stress management programmes such as MBSR interventions for staff. This would be an important step in acknowledging the need for self-care skills for staff at all levels within an organisation. Some 'on the job' studies have shown mixed results when MBSR interventions are integrated into nurses' working day (Gauthier et al. 2015; Horner et al. 2014; Fourer et al. 2013). However, ultimately patient care will always be a priority, which can compromise MBSR attendance. The feasibility of nurses being able to learn the skills and fully engage in mindfulness training during a busy 12 hour shift is another practical element of workplace MBSR interventions that has yet to be addressed. While the concept of mindfulness sounds relatively simple, it can be challenging. Participants need to acquire new skills which necessitate commitment and dedicated time allocated to daily practice that can eventually confer the benefits of MBSR. Many of the MBSR studies do not allude to the need for independent meditation or acknowledge that mindfulness is transformative process (White, 2014).

In conclusion, MBSR is a potentially effective intervention that can equip nurses with the self-care skills to face challenges and manage the demands placed upon them while being present with their patients and responsive to their patients' needs to ensure quality in the nurse - patient interaction.

Key points for policy, practice and/or research

- In this study, acute care nurses reported high levels of perceived stress before mindfulness based stress reduction (MBSR) intervention

- This study has shown that MBSR is a self-care measure that reduces acute care nurses' perceived stress and enhances their compassion

- Health care organisations have a responsibility to ensure that all nurses have access to programmes that reduce their stress, such as a MBSR programme

- Future research should establish the minimum duration for a MBSR programme that can produce effective results and fits within the constraints of nurses' shift work

Conflict of interest: The Authors declare that there is no conflict of interest.

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